

# Progress Toward Completion of the Mathematics Major

## Applied Mathematics Concentration

Arts and Sciences students may be admitted to the math major after successfully completing a semester of multivariable calculus, a semester of linear algebra, and a 3- or 4-credit computer programming course. Visit [math.cornell.edu/major](http://math.cornell.edu/major) for more information.

Student's Name	Net ID	Faculty Advisor
_____	_____	_____
Courses needed to complete the major		
_____		initials _____
_____		date _____

Math majors must complete **9 courses** for the major, as described in items 1–3 below, with a **minimum grade of C–**. MATH courses numbered 5000–5999 do not count. No course may be used to satisfy more than one requirement.

\_\_\_\_\_ At least two of the MATH courses taken must be at the 4000 level (or above).

### 1. Two Courses in Algebra. ( \_\_\_ transfer credit applied, see reverse)

- \_\_\_\_\_ MATH 3320 Introduction to Number Theory
- \_\_\_\_\_ MATH 3340\* Abstract Algebra
- \_\_\_\_\_ MATH 4310\* Linear Algebra
- \_\_\_\_\_ MATH 4330\* Honors Linear Algebra
- \_\_\_\_\_ MATH 4340\* Honors Introduction to Algebra
- \_\_\_\_\_ MATH 4370 Computational Algebra
- \_\_\_\_\_ MATH 4500 Matrix Groups
- \_\_\_\_\_ MATH 4560 Geometry of Discrete Groups
- \_\_\_\_\_ MATH 3360\* Applicable Algebra
- \_\_\_\_\_ MATH 4315\* Linear Algebra with Supplements

### 2. Two Courses in Analysis. ( \_\_\_ transfer credit applied, see reverse)

- \_\_\_\_\_ MATH 3110\* Introduction to Analysis
- \_\_\_\_\_ MATH 3210 Manifolds & Differential Forms
- \_\_\_\_\_ MATH 3230\* Introduction to Differential Equations
- \_\_\_\_\_ MATH 4130\* Honors Intro Analysis I
- \_\_\_\_\_ MATH 4140 Honors Intro Analysis II
- \_\_\_\_\_ MATH 4180\* Complex Analysis
- \_\_\_\_\_ MATH 4200\* Differential Equations and Dynamical Systems
- \_\_\_\_\_ MATH 4210\* Nonlinear Dynamics and Chaos [also MAE 5790]
- \_\_\_\_\_ MATH 4220\* Applied Complex Analysis
- \_\_\_\_\_ MATH 4250 Numerical Analysis and Differential Equations [also CS 4210]
- \_\_\_\_\_ MATH 4260 Numerical Analysis: Linear & Nonlinear Equations [also CS 4220; co-meets w/CS 5223]
- \_\_\_\_\_ MATH 4280\* Introduction to Partial Differential Equations

**\*Forbidden Overlaps:** Due to an overlap in content, students will receive credit for only one course in each group:

- (1) MATH 3110, 4130; (2) MATH 3230, 4280; (3) MATH 3340, 3360; (4) MATH 3340, 4340; (5) MATH 4180, 4220; (6) MATH 4200, 4210;
- (7) MATH 4310, 4315, 4330; (8) MATH 4710, ECON 3130, BTRY 3080; (9) MATH 4720, ECON 3130, BTRY 4090; (10) MATH 4810, 4860.

Of the 9 courses used to fulfill requirements (1), (2), (3 iii), and (3 iv) of the math major, at least one course must be taken from three of the four Groups A, B, C, and D described on the next page. Non-MATH courses in these groups may be used toward the math modeling requirement (3 iv).

**3. Concentration in Applied Mathematics.** ( \_\_\_ transfer credit applied, see below)

Five additional courses from (iii) and (iv) below.

(iii) At least three MATH courses numbered 3000 or above:

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(iv) At least one course dealing with mathematical models. Eligible courses include MATH 3610 and any course outside mathematics with serious mathematical content that deals with scientific matters. Serious mathematical content includes, but is not limited to, extensive use of calculus or linear algebra. Any course from another department that would satisfy one of the other concentrations may be used.

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At most one of the following may be used:

- \_\_\_\_\_ CS 2110 Object-Oriented Programming and Data Structures [also ENGRD 2110]
- \_\_\_\_\_ PHYS 1116 Physics I: Mechanics and Special Relativity
- \_\_\_\_\_ PHYS 2208 Fundamentals of Physics II
- \_\_\_\_\_ PHYS 2213 Physics II: Electromagnetism
- \_\_\_\_\_ PHYS 2217 Physics II: Electricity and Magnetism [also AEP 2170]

Other 1000-level physics courses and PHYS 2207 may *not* be used. AP credit may *not* be used.

**Transfer Credit / Study Abroad Courses Applied to the Major**

Course Number & Title	Institution	Requirement
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 (1) MATH 3110, 4130; (2) MATH 3230, 4280; (3) MATH 3340, 3360; (4) MATH 3340, 4340; (5) MATH 4180, 4220; (6) MATH 4200, 4210;  
 (7) MATH 4310, 4315, 4330; (8) MATH 4710, ECON 3130, BTRY 3080; (9) MATH 4720, ECON 3130, BTRY 4090; (10) MATH 4810, 4860.

## Applied Mathematics Concentration

Of the 9 courses used to fulfill requirements (1), (2), (3 iii), and (3 iv) of the math major, at least one course must be taken from three of the four Groups A, B, C, and D below.

### **Group A. Differential equations**

- \_\_\_\_\_ MATH 3230\* Introduction to Differential Equations
- \_\_\_\_\_ MATH 4200\* Differential Equations and Dynamical Systems
- \_\_\_\_\_ MATH 4210\* Nonlinear Dynamics and Chaos [also MAE 5790]
- \_\_\_\_\_ MATH 4280\* Introduction to Partial Differential Equations

### **Group B. Discrete mathematics and combinatorics**

- \_\_\_\_\_ MATH 3360 Applicable Algebra
- \_\_\_\_\_ MATH 4370 Computational Algebra
- \_\_\_\_\_ MATH 4410 Introduction to Combinatorics I
- \_\_\_\_\_ MATH 4420 Introduction to Combinatorics II
- \_\_\_\_\_ MATH 4550 Applicable Geometry
- \_\_\_\_\_ CS 4820 Introduction to Analysis of Algorithms
- \_\_\_\_\_ ECON 4020 Game Theory
- \_\_\_\_\_ ORIE 3300 Optimization I [co-meets with ORIE 5300]
- \_\_\_\_\_ ORIE 4350 Introduction to Game Theory

### **Group C. Numerical and computational methods**

- \_\_\_\_\_ MATH 4250 Numerical Analysis and Differential Equations [also CS 4210]
- \_\_\_\_\_ MATH 4260 Numerical Analysis: Linear and Nonlinear Problems [also CS 4220; co-meets w/CS 5223]
- \_\_\_\_\_ CS 4620 Introduction to Computer Graphics [co-meets with CS 5620]
- \_\_\_\_\_ CS 4670 Introduction to Computer Vision [co-meets with CS 5670]
- \_\_\_\_\_ MAE 4700 Finite Element Analysis for Mechanical and Aerospace Design  
[co-meets w/MAE 4701, 5700]

### **Group D. Probability and statistics**

- \_\_\_\_\_ MATH 4710\* Basic Probability
- \_\_\_\_\_ MATH 4720\* Statistics
- \_\_\_\_\_ MATH 4740 Stochastic Processes
- \_\_\_\_\_ ECON 3130\* Statistics and Probability
- \_\_\_\_\_ ORIE 3500 Engineering Probability and Statistics II [co-meets with ORIE 5500]
- \_\_\_\_\_ STSCI 3080\* Probability Models and Inference [also BTRY 3080, ILRST 3080]
- \_\_\_\_\_ STSCI 3100 Statistical Sampling [also BTRY 3100, ILRST 3100]
- \_\_\_\_\_ STSCI 4030 Linear Models with Matrices [also BTRY 4030]
- \_\_\_\_\_ STSCI 4100 Multivariate Analysis [also BTRY 4100, ILRST 4100]

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